

# Discriminatory features (hand-crafted or deep learning based) using subspace manifolds

Computer Vision (CS6350)  
TPA - 13

## 1 Problem Statement

In classification, it is typically assumed that the labeled training data comes from the same distribution as that of the test data. However, many real world applications, especially in computer vision, challenge this assumption. In this context, the learner must take special care during the learning process to infer models that adapt well to the test data they are deployed on. Subspace based adaptation is a promising approach to tackle these unsupervised visual problems. This project aims to generate intermediate representations in the form of subspaces along the geodesic path connecting the source subspace and the target subspace on manifold (e.g. Grassmann). Finally, the source data is to be projected onto these learned subspaces for a classifier to be learned.

## 2 Input

- Standard object recognition inputs in transfer learning setting.

## 3 Assumptions

- Training and test data should be from different domains.

## 4 Output

- Class label of the recognized object.
- Rank-1 recognition rate.

## 5 Datasets

- Office, Caltech-10, PASCAL-VOC-2007.

## 6 References

- Fernando et.al. “Unsupervised Visual Domain Adaptation Using Subspace Alignment”, ICCV 2013.
- Nokleby, Matthew, Miguel Rodrigues, and Robert Calderbank. “Discrimination on the grassmann manifold: Fundamental limits of subspace classifiers.” IEEE Transactions on Information Theory, 2015.
- Kumar, Sriram, and Andreas Savakis. “Learning a perceptual manifold for image set classification.” ICIP 2016.